MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2017/2018

BMM 1014 – MATHEMATICS FOR MANAGERS

(All Sections / Groups)

13 MARCH 2018
9.00 AM – 11.00 AM
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 6 pages with 4 questions only.
2. Attempt all **FOUR** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided.
4. Formulae are attached at the end of the question paper.

QUESTION 1

(a) In 2016, Lee Thing Sdn Bhd, a copier manufacturer, has a monthly fixed cost of RM3,030,030 and a production cost of RM1,011 for each copier manufactured. Each copier is sold at a price of RM1,511. In 2017, the increased in material cost has raised the production cost to RM1,209 per copier and fixed cost increase to RM3,036,915.

(i) Find the monthly break-even quantity of Lee Thing Sdn Bhd in 2016.

(3 marks)

(ii) Find the profit or loss of the company in 2016 if the company managed to sell 5910 copiers?

(3 marks)

(iii) Find the break-even level of the company for the year 2017.

(3 marks)

(iv) If the company was able to sell 6919 copiers in 2016, what price should be charged in order to break even?

(3 marks)

(b) AL-Reyashi Sdn Bhd produces three brands of perfumes, namely EDP, EDT, and EDC. Each EDP perfume requires 3 hours of mixing, 4 hours of alcoholization, and 2 hours of filtration. Each EDT perfume requires 1 hour of mixing, 2 hours of alcoholization, and 3 hours of filtration. Each EDC perfume requires 5 hours of mixing, 8 hours of alcoholization, and 7 hours of filtration. There are 4770 hours available each week in the mixing department, 7137 hours in the filtration department, and 7716 hours in the alcoholization department. How many perfumes of each brand should be produced each week if all available time is used?

(13 marks)

(Total: 25 marks)

Continued...

QUESTION 2

A light bulb company produces HID bulb and LED bulb. Long-term projections indicate an expected demand of at least 100 HID and 80 LED bulbs each day. Because of limitations on production capacity, no more than 200 HID and 170 LED bulbs can be made daily. To satisfy a shipping contract, a total of at least 200 bulbs much be shipped each day. Each HID bulb produces a RM 2.50 profit and each LED bulb produces a RM 6 profit.

(a) Formulate the above problem as a Linear Programming problem.

(5 marks)

(b) Graph and show the feasible region of the above problem clearly.

(6 marks)

(c) Find the optimal solution and the associated maximum total profit.

(11 marks)

(d) What would be the effect on the optimal solution if the profit of the LED bulb has increased from RM 6 to RM 9?

(3 marks)

(Total: 25 marks)

Continued...

QUESTION 3

(a) How long will it take for an amount of RM 100,100 to yield RM 10,500 at a simple interest rate 7.55% per annum?

(4 marks)

(b) What is the difference between the compound interests on RM 3,969 for 2.5 years at 6.24% compounded annually and semiannually?

(10 marks)

(c) If RM10,500 is deposited in a saving account that earns interest at an annual rate of 7.7% compounded continuously, what is the value of the account at the end of twelve years?

(5 marks)

(d) In January 2018, the average rate for a 30-year fixed mortgage was 4.43% per year compounded monthly. Assume a down payment of 20% on a home purchase of RM300,900. What will be the monthly payment?

(6 marks)

(Total: 25 marks)

Continued...

QUESTION 4

(a) Find the indefinite integral $\int 9x^8\sqrt{10-x^9}\,dx$

(5 marks)

(b) Debbie Tan Company has started selling a new type of speaker. The demand equation for a new brand X speaker for this year is given by

$$p = \frac{1}{12}x^2 - 7.5x + 125$$

$0 \leq x \leq 30$. Find the value of x (in unit) and the corresponding price p (in RM) that maximize the revenue.

(7 marks)

(c) A Happy Festival promoter produces two types of pewters; type A sells for \$25, and type B sells for \$50. The total revenue (in thousands of RM) is given by

$$R(x,y) = 25x + 50y$$

and the total cost (in thousands of RM) of producing these pewters is given by

$$C(x,y) = 10x^2 - 6xy + 1.5y^2 - 19x + 56y - 20$$

where x denotes thousand pewters of type A and y denotes thousand pewters of type B produced and sold. How many of each type of pewters must be produced and sold in order to maximize profit? What is the maximum profit realizable?

(13 marks)

(Total: 25 marks)

Continued...

LIST OF FORMULA

1. Quadratic Formula

The solution of the equation:
$ax^2 + bx + c = 0$,
$a \neq 0$, are $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

2. Simple Interest

Interest, $I = Prt$ (P = principal, r = interest rate, t = number of years)
Accumulated amount, $A = P(1 + rt)$

3. Compound Interest

Accumulated amount, $A = P(1 + i)^n$, where $i = r/m$, and $n = mt$ (m = number of conversion periods per year)

4. Continuous Compound Interest

$A = Pe^{rt}$

5. Effective Rate of Interest

$r_{eff} = (1 + r/m)^m - 1$

6. Present Value for Compound Interest

$P = A(1 + i)^{-n}$

7. Future Value of an Annuity

$$S = R\left[\frac{(1+i)^n - 1}{i}\right]$$

(S = future value of ordinary annuity of n payments of R dollars periodic payment)

8. Present Value of an Annuity

$$P = R\left[\frac{1-(1+i)^{-n}}{i}\right]$$

(P = present value of ordinary annuity of n payments of R dollars periodic payment)

Continued...

9. Amortization Formula

$$R = \left[\frac{Pi}{1-(1+i)^{-n}} \right]$$

(R = periodic payment on a loan of P dollars to be amortized over n periods)

10. Sinking Fund Formula

$$R = \left[\frac{Si}{(1+i)^{n}-1} \right]$$

(R = periodic payment required to accumulate S dollars over n periods)

11. Break-even point = $\frac{\text{Fixed Cost}}{\text{Contribution per unit}}$ (Contribution per unit = unit selling price – unit variable cost)

Sales (unit) = $\frac{\text{Fixed cost + Target profit}}{\text{Contribution per unit}}$

Calculus

12. Product rule

$$f(x) = u(x).v(x)$$

$$f'(x) = u(x).\frac{dv}{dx} + v(x).\frac{du}{dx}$$

13. Quotient rule

$$f(x) = \frac{u(x)}{v(x)}$$

$$f'(x) = \frac{v(x)\frac{du}{dx} - u(x)\frac{dv}{dx}}{[v(x)]^2}$$

End of Paper